

# and Legacy Forces

By WILLIAMSON MURRAY and THOMAS O'LEARY

he widespread belief that transformation involves uniform change and is driven towards a common goal reflects a misunderstanding of transformation and innovation. Moreover, to point at a date when transformation of a force will be complete is to miss reality, for by that time a host of factors will have changed—the strategic environment, technologies, defense budgets, and concepts that

Williamson Murray is a staff member of the Institute for Defense Analyses and Colonel Thomas O'Leary, USMC (Ret.), is a senior research fellow at the Potomac Institute for Policy Studies. underlie peacetime preparation for war. Transformation occurs in human organizations on an ongoing basis. Like their human masters, organizations that do not change die.

Two case studies—creation of combined arms formations spearheaded by tanks in the interwar German army and the American development of airpower tactics centered on precision and stealth during the Persian Gulf War—show how a relatively small number of transformed forces can greatly improve the entire force. There is also a belief that either technological change or new platforms are the primary drivers of transformation. History suggests otherwise. More

important than new technology or weapon systems have been innovative concepts and the theoretical and doctrinal underpinnings of military organizations. Such a change lies in the ability of organizations to combine their experiences into a coherent picture of future war that is realistic and adaptable to changing realities. It then demands change in the widest sense: the transformation of the conceptual basis of future war throughout the force.

Technological change can help extend such a vision, but it is only an enabler. Without that coherent vision, developed into a broad, realistic doctrine that informs the force, transformation becomes platform-driven at best and an inade-

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quate reaction to the external stimuli of battle at worst. An example is the development of airpower doctrine by Britain and the United States during the interwar years.

The Royal Air Force and U.S. Army Air Corps were so focused on the strategic bomber as the platform of choice that both missed the contributions airpower could make to joint warfighting. As a result, the Germans gained an advantage in the early battles of World War II through innovative use of combined-arms tactics involving infantry, tanks, and airpower.

## **Enablers and Intangibles**

In most cases, technology and platforms have been enablers that allow forces to maximize intangibles such as doctrine, training, and leadership. Moreover, history shows that militaries which best transformed their forces and then won major victories on the battlefield often possessed distinctly inferior platforms and technology. These examples reveal that the development, institutionalization, and refinement of a doctrinal framework for war that reaches across forces—however incomplete the technological transformation might be—are crucial.

Militaries innovate during times of peace and within an atmosphere of ambiguity. Leaders and planners rarely know when they will fight; nor do they always know who they will fight. Some questions are perennial. What will be the context of future war? What might its objectives be? How will enemy forces evolve and prepare? What tactical and technological changes might occur, and how might they influence the conduct of operations? The answers are unclear to those who transform forces in peacetime.

Leaders and their staffs consistently confront hard choices in peace as well as war. As General James Wolfe, the British conqueror of Quebec, noted, "War is an option of difficulties." New ideas, however attractive, do not guarantee that a military can address the actual strategic and operational questions it will confront. Consequently, few planners are willing to bet all their resources on a single untried form of war. The Royal Air Force decision to invest most of its resources in strategic bombers, which flew in the face of any reasonable analysis of air combat in World War I, made British airpower singularly incapable of intervening in ground battles to defend France in May 1940. The loss of forty out of seventy bombers dispatched to attack bridges across the Meuse on May 14 suggests the dangers of betting on a single horse. Not only were the losses devastating, but the bridges survived.

A partially transformed force may possess formations, units, and capabilities that are incapable of synergy. Nevertheless, despite the considerable disparity between the *Wehrmacht Panzer* arm and the battered infantry units that made up most of the German army in 1944, the high command was able to knit together an effective scheme for defending Normandy. Here, a common, realistic warfighting doctrine was the thread holding forces with quite different capabilities together while maximizing their potential.

#### **Let There Be Tanks**

The Treaty of Versailles imposed crushing terms on Germany following its defeat in World War I. It set a limit of 100,000 men with 5,000 officers for the army and forbade weapon systems such as tanks, aircraft, submarines, and heavy artillery. Thus the military was denied crucial weapons that emerged from the war. How it addressed that predicament provides a study in intelligent innovation.

The army turned to learning the real lessons of the war under General Hans von Seeckt. By 1923 the Germans distilled their findings into a coherent doctrinal framework of combined arms tactics that emphasized decentralized leadership, mission-type orders, and ruthless training. Three Reichsheer senior generals refined the regulations in 1932. Of those officers, General Werner von Fritsch became the army commander in chief as German rearmament began the following year and General Ludwig Beck became chief of the Great General Staff, arguably the most prestigious position in the army. The resulting doctrinal manual, Die Truppenführung, was published in 1933 and became the basis for the approach to combat throughout World War II. While the army did not yet possess a single tank, Die Truppenführung explicitly foresaw armored fighting vehicles as a key to operational freedom—in other words, to translating the infantry exploitation of 1918 onto a wholly new plane.

Adolf Hitler became chancellor in January 1933. In the initial years of the Nazi state, he focused on solidifying his dictatorship and overturning the provisions of the Treaty of Versailles. Knowing full well that his goals would lead to a general European war, *Der Führer* provided the services, including the new *Luftwaffe*, with blank checks to begin massive rearmament.

For the army, the processes could not take place within a theoretical framework. Germany confronted hostile neighbors, made doubly suspicious by the revolutionary nature of the new regime. Hitler recognized the possibility that they might take matters into their own hands by launching a preventive war. He warned senior generals during his first days in power that if France had any real leaders, it would attempt to throttle the Nazi regime at its birth. Thus the

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strategic imperative was a force that could defend *Reich* frontiers in the immediate future while preparing for a long-

term war of conquest. The initial force had to emphasize the army's current strengths and experience levels—conventional infantry and artillery.

Moreover, two difficulties militated against turning the entire army into a revolutionary, mechanized, combined-arms force: resources and the state of knowledge in the army as to mechanized tactics, operations, organization, and training. Germany had virtually no access to petroleum during the early stages of rearmament. The nearest major source was Romania, and the Romanians, along with the Czechs and Poles, were hostile to Germany. Thus a wholly mechanized army might have lacked fuel to even defend itself.

But equally important to planners was army inexperience with tanks after 1919. Heinz Guderian was shipped off to observe what the Swedes were doing when he was appointed as the General Staff officer in charge of armored warfare in 1926. As his memoirs make clear, it was the first time he had seen a tank.<sup>2</sup> Admittedly, the Germans maintained a secret military relationship with the Soviets during the late 1920s and early 1930s and were able to experiment with tanks and aircraft. But suspicion between them constrained what they could learn.

Thus, as rearmament began, the army possessed not a single tank, had few officers experienced with armored vehicles, and had only rudimentary designs for tanks on the drawing board. The first two vehicles that the German army received from Krupp, the Mark I (six tons and armed with machine guns) and the Mark II (ten

tons with a 20mm cannon), were obsolete when they entered serial production in 1934. Not until 1938 with the first Mark III (initially armed with only a 37mm cannon) and Mark IV (armed with a 75mm low-velocity gun) did the Germans possess their first modern tanks.

Nevertheless, even in 1940 the great majority of the German armored fighting vehicles would be Mark Is and IIs, while in 1941 obsolete Mark IIs and Czech tanks made up much of the Panzer equipment in the invasion of the Soviet Union. The most recent study of the Battle of France indicates an overall tank strength for the Panzer divisions of 2,439: 523 Mark Is, 955 Mark IIs, 106 Czech 35 (t)s, 228 Czech 38 (t)s, 349 Mark IIIs, and 278 Mark IVs. Opposing them were 674 modern French tanks in most respects superior to the Mark IIIs and IVs, with a further 2,535 tanks, the capabilities of which were similar to the more obsolete German models. The British contributed an additional 310 armored fighting vehicles, all superior to the Mark Is and IIs in virtually every aspect from armor to firepower.3 Thus the Allies had an advantage of over a thousand tanks when the 1940 campaign began.

The 1941 disparity between the *Wehrmacht* and the Red army was greater. Against a Soviet inventory of over 20,000 armored fighting vehicles, including awesome T–34s, *Panzer* divisions had only 3,255 tanks: 281 Mark Is,<sup>4</sup> 743 Mark IIs, 157 Czech 35 (t)s, 651 Czech 38 (t)s, 979 Mark IIIs, and 444 Mark IVs. Thus over half of the armor in June 1941 was still obsolete.

#### **Synergy Between Forces**

Creative thinking about mechanized warfare more than compenstated for the German lack of world-class tanks at the outset of World War II. In 1935 Fritsch and Beck were so impressed by the performance of tank units that they established the first three *Panzer* divisions as well as a number of independent tank battalions for infantry support and division-sized formations—called light divisions—that combined infantry, tanks, and cavalry to perform reconnaissance.

The army experimented with various armored formations in exercises from 1935 through 1938. At the same time, the General Staff was executing staff rides and wargames to test whether armored warfare could extend and speed the exploitation of breakthroughs. Beck conducted a staff ride in spring 1935 that featured a *Panzer* corps—before the army possessed an armored division. The General Staff studied possibilities for a *Panzer* army the following year. However, it was not until summer 1938 that leaders were confident enough about the capabilities of armored formations and access to petroleum to organize three more *Panzer* divisions. At the same time,



Invading Russia.

they did away with the independent *Panzer* battalions but kept the four light divisions—a combination of cavalry and motorized troops—to see how they would perform in the coming war.

Hitler attacked Poland in September 1939. Of 54 participating active and reserve divisions, only six were *Panzer*, while four were light and four were motorized infantry. The remaining forty were infantry or mountain divisions that differed little from German attack divisions on the Western Front in spring 1918. Yet that small *Panzer* force exploited crucial breakthroughs and destroyed any chance of a prolonged Polish resistance by the third day of the campaign. There had been considerable skepticism within the army over the ability of armored formations to exploit deep penetration, but the Polish campaign convinced most senior leaders of the capabilities of armored combined-arms forces.

The high command disestablished the light divisions and converted them into *Panzer* divisions immediately after the Polish campaign. Thus in the western campaign in May 1940, the *Wehrmacht* (including *Waffen SS*) consisted of 10 *Panzer* divisions, 8 motorized infantry divisions, and 118 regular infantry divisions. *Panzer* divisions made up 8 percent of the force, while the bulk of divisions were equipped and looked much

like other European formations. But the *Panzer* divisions offered capabilities for maneuver war that no other European army could match and *Wehrmacht* infantry divisions had the same doctrine and concept of operations as the armored force.

The synergy between the two forces proved devastating in the French campaign. Fall Gelb (Case Yellow, the code name for the offensive to destroy Western ground forces) rested on the assumption that the French would protect the Ardennes Forest with a relatively thin force while the bulk of Allied ground forces moved rapidly to defend Belgium. The Germans therefore planned to attack through the rugged Ardennes but needed to draw French attention elsewhere until they reached the Meuse River. Army Group B, under Colonel General Fedor von Bock, received that mission. Bock had three Panzer divisions (one assigned to the invasion of The Netherlands), as well as a picked force of paratroopers to attack the fortress of Eban Emael in

Belgium. Nevertheless, the bulk of his forces consisted of 26 infantry divisions which relied on horse-drawn equipment and marched to the sound of guns. While Army Group B hammered through northern Belgium, Colonel General Gerd von Rundstedt with Army Group A pushed three corps with seven *Panzer* divisions through the Ardennes. The mechanized forces were to immediately cross the Meuse when they reached it. If they failed to achieve a breakthrough, follow-on infantry forces would make the breach, allowing further exploitation by *Panzer* units.

The plan worked better than expected, so well in fact that General Heinz Guderian described it as "almost a miracle." The Army Group B advance kept French attention focused on The Netherlands and northern Belgium. Bock's thrust, aided by the skillful use of small paratrooper and glider-borne units, broke through Belgian and Dutch defenses. With the forward thrust of his infantry formations, Bock created the impression that the main German emphasis lay in the north—exactly where the French expected it.

# **A Victory for Legacy Forces**

Meanwhile to the south, mechanized forces advanced through the Ardennes and reached the Meuse on the evening of May 12. The Germans launched their motorized infantry regiments (an integral part of each *Panzer* division) across the river the next day, breaking through the French

defenses within 24 hours. These infantry units, supported by artillery and sometimes *Luftwaffe* aircraft, made the initial breakthrough. Armor did not cross the Meuse until the engineers had constructed bridges fifteen hours after the initial crossing. Thus even the transformed, leading-edge *Wehrmacht* formations depended on legacy forces to achieve the crucial breakthrough, the first step in creating a breach *Panzer* units could exploit, although the attacking infantry suffered upwards of 50 to 70 percent casualties in the lead companies.

The ensuing exploitation, which carried the *Panzer* divisions to the Channel coast, cut off the Allied left wing, composed of the best French divisions and the entire British expeditionary

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force. The Allies extracted 330,000 troops from the resulting envelopment through the Dunkirk evacuation, but these forces lost all their equipment and much of their cohesion.

The German victory brought the collapse of France, while only the English Channel and Fighter Command saved Britain.

The 1940 campaign—one of the most devastating, one-sided victories in history—appeared to almost everyone except the Germans as a revolution in military affairs. In fact, it resulted from the combined efforts of legacy forces, which in terms of division-sized units made up 90 percent of the force structure, and the 10 percent transformed force. The French could not adapt to the tempo and exploitation posed by this combination. The glue that held both forces together was a doctrine emphasizing speed, decentralized mission-type orders, decentralized command and control, and rapid exploitation of opportunities.

Equally important was planning, in which the *Wehrmacht* utilized a combination of units with revolutionary capabilities to open the door to legacy forces and vice versa. Even in the north, small transformed units helped legacy forces. The glider-borne assault of eighty paratroopers, who took out the fortress at Eban Emael early in the offensive, enormously aided Bock's infantry advance while infantry units in the south, supported by artillery, largely enabled the breakthrough by Rundstedt's *Panzer* divisions in an operation that was fully in accordance with the German tactical practices of March 1918.

One could ask if the Germans might have done better by investing more in *Panzer* divisions.

Such Monday-morning quarterbacking overlooks the daunting ambiguities the Germans confronted as they began to rearm. We know how the *Panzer* divisions performed—they did not. With an economy ravished by the Great Depression, they made prudent choices and developed capabilities that nearly destroyed the European balance of power. Responding to the circumstances of the times, they developed a combination of new and legacy forces that proved all too effective on the early battlefields of World War II.

# **Dawning of Precision**

When the Persian Gulf crisis exploded with the invasion of Kuwait in August 1990, American airmen were largely ignorant of the possibilities technological changes had brought about since the Vietnam War. A small percentage of the fighter force could employ precision-guided munitions (PGMs) while fewer had stealth capabilities. Yet the imaginative way in which a few air planners utilized these new technologies reveals how a small transformed group can enhance the overall capabilities of legacy forces.

Pundits depict the Gulf War as heralding a new era with its use of PGMs. It did not. The air campaign utilized 9,300 PGMs, but the two great 1972 air campaigns in Vietnam—Linebacker I and Linebacker II—dropped three times that number on targets in North and South Vietnam.<sup>6</sup> Moreover, the greater accuracy of U.S. tactical aircraft was crucial in blunting the Easter offensive by the communists as well as to the devastating attacks that finally pushed Hanoi to the Paris Peace Accords.

Tactical air forces (Navy, Marine Corps, and Air Force) gave relatively little attention to precision weaponry between 1972 and 1990. The Navy and Marines made minimal efforts to adapt, and even the Air Force failed to highlight such capabilities in designing new aircraft. Virtually the entire F-16 fleet continued to use unguided munitions through the end of the Gulf War. When F-15Es showed up in Saudi Arabia in autumn 1990, they had no low altitude navigation and targeting infrared for night targeting pods despite their main mission being air-to-ground strike. Moreover, initial plans for F–111 deployment in August 1990 called for the D model, which had no PGM capabilities. Only through a last minute intervention by the Secretary of the Air Force were they replaced with PGM-capable F models.

The stealth situation was even more limited. The F–117 program had developed the first stealth aircraft, but only 59 had been produced. The program had remained in the black world through the end of the 1980s, with few people in the Air Force, including senior leaders, having been exposed to the aircraft or its capabilities.



USS Missouri opening fire at Iraqi targets, Desert Storm.

The initial response of the Armed Forces to the Kuwait invasion was unimpressive. The Navy suggested resurrecting the route pack system, an operational approach that simply had divided Vietnam into Air Force and Navy sectors. The resulting air campaign lacked even elementary coordination and cooperation, minimized U.S. capabilities, and exacerbated interservice competition of the worst sort. Fortunately, the theater commander, General Norman Schwarzkopf, USA, rejected that approach and embraced a relatively new concept involving a single joint force air component commander (IFACC).

Parts of the Air Force showed little operational imagination about how the new technological possibilities could affect an air campaign against Iraq. Tactical Air Command (TAC), the forerunner of Air Combat Command, suggested the combination of a roll-back campaign with efforts to signal American resolve to liberate Kuwait. The plan represented a badly conceived replay of the Rolling Thunder air campaign against North Vietnam. The TAC proposal was to begin "with demonstrated attacks against high value targets . . . [and then escalation] as required until all significant targets are destroyed." The TAC briefing then stated that "this strategy allows time and opportunity for Hussein to reevaluate his situation and back out while there is something to save." The air effort would concentrate

on targets "that reduce [Iraq's] ability to project power... and infrastructure to support offensive operations." None of this demonstrated the slightest understanding that stealth combined with precision allowed a significantly different approach to air war.

Luckily, JFACC—Lieutenant General Chuck Horner, USAF—directed two airmen, Brigadier General Buster Glosson and Lieutenant Colonel David Deptula, to fashion a new operational approach to attacking Saddam. Both were imaginative planners who sought ways to leverage stealth and precision capabilities to improve the overall impact of legacy forces as well as new technologies. By early September they were in charge of a planning cell called the black hole because officers disappeared into it and did not return to their regular jobs.

The largest challenge confronting Glosson and Deptula was an integrated air defense system, which combined French and Soviet technology into an apparently formidable protection. They also had some of the most up to date Western and Soviet radars and missiles tied together by a sophisticated French computer system, code named KARI (Iraq spelled backwards in French). The duo rejected a roll-back approach in favor of an inside-out attack from the first. The initial

strike by Coalition aircraft would aim at taking down the communication centers in the middle of Iraq. Stealth would play the crucial role. And unlike many airmen, Glosson and Deptula believed that stealth F–117s could reach undetected deep into Iraq—all the way to Baghdad and the very heart of KARI.

## **Sowing Confusion**

In planning the opening night's attack, Deptula provided an additional insight: What mattered was not the destruction achieved but the disruption and confusion sown throughout the air defense system. The first moves featured stealth F–117s dropping laser guided bombs (LGBs) and Navy Tomahawk land attack missiles (TLAMs) striking command and control nodes. After these strikes had disrupted air defense, non-

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stealth forces would complete the take-down of the system. The emphasis on disruption showed most clearly in the attacks on the sector operating centers. Air Force intelligence had recommended the use

of upwards of six LGBs on each center to achieve complete destruction. But the black hole reasoned that one bomb on each would discourage the survivors from remaining in place to operate their systems.

The first attacks occured 21 minutes before H-Hour, with Apache helicopters attacking frontier radar sites and opening the way for F-15Es, supported by EF-111 jammers, to strike Scud bases in western Iraq. By that time F-117s had reached Iraqi airspace and Navy ships had launched TLAMs. The first F-117 strike came nine minutes before H-Hour at the Nukhayb interceptor operations center (IOC), the reporting node with the best chance of picking up the F-15E mission aimed at the Scuds. At H-Hour, F-117s attacked the first targets in the capital region. Hits on the AT&T Building and the telecommunications center took CNN off the air and alerted planners in Riyadh to the strikes. Within the next six minutes other strikes hit the main air force headquarters twice as well as the air defense operating center, presidential palace, and Salman Pak IOC.

Shortly after the first F–117 strikes, TLAMs began to hit their targets throughout Iraq, including leadership, electric, Ba'th Party, and chemical facilities. By now the Iraqis knew they were under a full-scale attack but had no idea from which direction or with what weapons. At that point, the full weight of suppression of enemy air defenses (SEAD) attacked the Baghdad area. The assumption underlying this legacy force strike was that the opening F–117 and TLAM attacks disrupted defenses and at the same time brought them to full alert and readiness to engage the attackers.

The planners presented the Iraqis with what looked like a massive conventional air assault on their capital. Almost immediately after the F–117 and TLAM attacks, early warning radars indicated that large, non-stealth formations were approaching from two directions. It was seemingly the massive assault the Iragis had expected the Americans would launch if they attacked at all. But in fact it wasn't fighter bombers, as it first seemed. Instead, both packages, including EA-6 and EF-111 jammers (to force enemy radars to come up to full power), consisted of SEAD aircraft. Those from the west came from carriers in the Red Sea while the package from the south consisted of Air Force F-4G Weasels. The Navy package fired off 25 tactical air-launched decoys within twenty minutes. BQM-74 drones, like the decoys, magnified the size of the attacking force as well as the closeness of attackers to Baghdad. Leading the Air Force package, the drones continued on to the capital, where they went into orbit.

All that activity was precisely what Air Force planners hoped for. At that point high-speed anti-radiation missile (HARM) shooters began firing. F/A–18s and A–7s from the Navy SEAD package fired off 45 HARMs in preset mode against known surface-to-air missile sites and six more at targets of opportunity, and the Weasels fired 22 missiles at operating sites, with ten assessed as destroying their targets.

At the same time the main SEAD packages were attacking Baghdad's air defenses, two similar packages struck, one against the air defenses near the Scud bases and the other in the east against the defenses around Basra. Again the initial moves spooked the Iragis into full alert when their radars and sites were once more clobbered by large numbers of HARMs. As the Weasel wing commander noted, "The key is that very early on while the F-15s maintained air superiority, the Weasels maintained suppression of enemy air defense...because they beat them down quickly, efficiently, and the enemy knew if he turned his radar on he's dead. As a result of that, they are not turning their radars on.... They're firing their missiles off ballistically. For the most part they are completely ineffective."8

While we still lack a full accounting of what happened within the confines of the KARI system, there was clearly enormous chaos and misinformation among commanders and staffs responsible for air defense. They undoubtedly found it difficult to evaluate the damage. To add to their confusion, the second F–117 strike followed on the heels of the SEAD strike. With no apparent aircraft



F-117A ready for mission, Desert Storm.

overhead, bombs were again falling on headquarters and communications centers.

The entire KARI system collapsed during the first hours of the war, never to recover. The plan and its execution leveraged the technological and tactical possibilities of stealth and precision to maximize the more conventional possibilities of the remainder of Coalition air forces. The result was a devastating victory that largely eliminated the antiaircraft capabilities on which Saddam had lavished so many resources for a decade. The fact that the attackers lost only one aircraft the first night (an F/A–18 to a MiG–29) underlines the extent to which clear conceptions had extended the transformed capabilities of the leading edge units to the entire force. The first night's attack on the

air defense system was the most decisive operational victory in the history of airpower.

The coming decades are likely to bring no significant increase in defense spending. Planners in the Department of Defense should think about transformation in terms of how best to combine new concepts of war with new technologies in order to extend capabilities rather than radically transforming the Armed Forces as a whole. By so doing, there is the possibility of moving into the future with the capabilities needed to meet a broad range of challenges. Such an approach would also allow for prudent changes that address the fundamental, unchanging nature of war, and the fact that human conflict is a lifeand-death matter in which confusion, uncertainty, fog, and friction will always dominate the landscape.

#### NOTES

- <sup>1</sup> See Fred Anderson, *Crucible of War, The Seven Years War and the Fate of Empire in British North America, 1754–1766* (New York: Alfred A. Knopf, 2000).
- <sup>2</sup> Heinz Guderian, *Panzer Leader* (New York: Ballentine Books, 1956), p. 12.
- <sup>3</sup> Karl-Heinz Frieser, *Blitzkrieg-Legende, Der Westfeldzug 1940* (Munich: Oldenbourg Verlag, 1995), pp. 48–49.
- <sup>4</sup> Robert J. O'Neill, "Doctrine and Training in the German Army," in *The Theory and Practice of War*, edited by Michael Howard (New York: Cassell and Co., 1966), p. 157.
  - <sup>5</sup> Guderian, Panzer Leader, p. 84.
- <sup>6</sup> Personnal conversation with Barry Watts, July 14, 2001; figures based on data collected during research for the Gulf War Air Power Survey.
- <sup>7</sup> Fax from General Griffith, TAC/XP, to General Alexander, AF/XOX, August 11, 1990, "CENTCOM Air Campaign Plan," Gulf War Air Power Survey Archive, CHSH-14.
- <sup>8</sup> Charles L. Starr, "Special Study, History of the 35<sup>th</sup> Tactical Fighter Wing (Provisional): Operations Desert Shield and Desert Storm," Gulf War Air Power Survey Archive, NA-277, p. 179.